

SFH600-0, SFH600-1, SFH600-2, SFH600-3, SFH600-4  
 SFH601-1, SFH601-2, SFH601-3, SFH601-4, SFH601-5  
 SFH609-1, SFH609-2, SFH609-3, SFH609-4, SFH609-5



## OPTICALLY COUPLED ISOLATOR PHOTOTRANSISTOR OUTPUT

### APPROVALS

- UL recognised, File No. E91231
- 'X' SPECIFICATION APPROVALS
  - VDE 0884 in 3 available lead forms :-
    - STD
    - G form
    - SMD approved to CECC 00802
 Excludes SFH609-4,-5
  - Certified to EN60950 by the following Test Bodies :-
    - Nemko - Certificate No. P01102465
    - Fimko - Certificate No. FI18162
    - Semko - Reference No. 0202041/01-25
    - Demko - Certificate No. 311161-01
 Excludes SFH600-0, 601-2, 609-4,-5
  - BSI approved - Certificate No. 8001
 Excludes SFH609-4,-5

### DESCRIPTION

The SFH600-, SFH601-, SFH609- series of optically coupled isolators consist of an infrared light emitting diode and a NPN silicon photo transistor in a standard 6 pin dual in line plastic package.

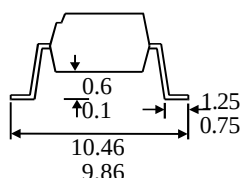
### FEATURES

- Options :-
  - 10mm lead spread - add G after part no.
  - Surface mount - add SM after part no.
  - Tape&reel - add SMT&R after part no.
- High  $BV_{CEO}$  (70V, 90V, 100V min)
- High Isolation Voltage (5.3kV<sub>RMS</sub>, 7.5kV<sub>PK</sub>)
- All electrical parameters 100% tested
- Custom electrical selections available

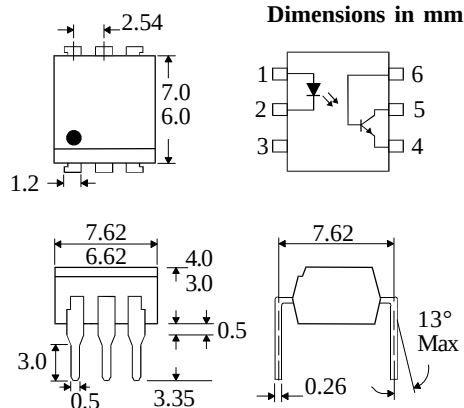
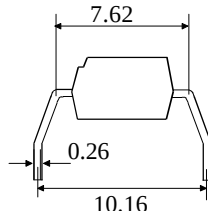
### APPLICATIONS

- DC motor controllers
- Industrial systems controllers
- Measuring instruments
- Signal transmission between systems of different potentials and impedances

#### OPTION SM SURFACE MOUNT



#### OPTION G



### ABSOLUTE MAXIMUM RATINGS (25°C unless otherwise specified)

Storage Temperature \_\_\_\_\_ -55°C to + 150°C  
 Operating Temperature \_\_\_\_\_ -55°C to + 100°C  
 Lead Soldering Temperature  
 (1/16 inch (1.6mm) from case for 10 secs) 260°C

### INPUT DIODE

Forward Current \_\_\_\_\_ 60mA  
 Reverse Voltage \_\_\_\_\_ 6V  
 Power Dissipation \_\_\_\_\_ 105mW

### OUTPUT TRANSISTOR

Collector-emitter Voltage  $BV_{CEO}$   
 SFH600-0,1,2,3,4 \_\_\_\_\_ 70V  
 SFH601-1,2,3,4,5 \_\_\_\_\_ 100V  
 SFH609-1,2,3,4,5 \_\_\_\_\_ 90V  
 Collector-base Voltage  $BV_{CBO}$   
 SFH600-0,1,2,3,4 \_\_\_\_\_ 70V  
 SFH601-1,2,3,4,5 \_\_\_\_\_ 100V  
 SFH609-1,2,3,4,5 \_\_\_\_\_ 90V  
 Emitter-collector Voltage  $BV_{ECO}$  \_\_\_\_\_ 6V  
 Power Dissipation \_\_\_\_\_ 160mW

### POWER DISSIPATION

Total Power Dissipation \_\_\_\_\_ 200mW  
 (derate linearly 2.67mW/°C above 25°C)

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**ELECTRICAL CHARACTERISTICS (  $T_A = 25^\circ\text{C}$  Unless otherwise noted )**

| PARAMETER |                                                                       | MIN                | TYP | MAX  | UNITS         | TEST CONDITION                        |
|-----------|-----------------------------------------------------------------------|--------------------|-----|------|---------------|---------------------------------------|
| Input     | Forward Voltage ( $V_F$ )                                             |                    | 1.2 | 1.65 | V             | $I_F = 60\text{mA}$                   |
|           | Reverse Current ( $I_R$ )                                             |                    |     | 10   | $\mu\text{A}$ | $V_R = 6\text{V}$                     |
| Output    | Collector-emitter Breakdown ( $BV_{CEO}$ )<br>SFH600-0, 1, 2, 3, 4    | 70                 |     |      | V             | $I_C = 1\text{mA}$ ( Note 2 )         |
|           | SFH601-1, 2, 3, 4, 5                                                  | 100                |     |      | V             |                                       |
|           | SFH609-1, 2, 3, 4, 5                                                  | 90                 |     |      | V             |                                       |
|           | Collector-base Breakdown ( $BV_{CBO}$ )<br>SFH600-0, 1, 2, 3, 4       | 70                 |     |      | V             | $I_C = 100\mu\text{A}$                |
|           | SFH601-1, 2, 3, 4, 5                                                  | 100                |     |      | V             |                                       |
|           | SFH609-1, 2, 3, 4, 5                                                  | 90                 |     |      | V             |                                       |
|           | Emitter-collector Breakdown ( $BV_{ECO}$ )                            | 6                  |     |      | V             | $I_E = 100\mu\text{A}$                |
|           | Collector-emitter Dark Current ( $I_{CEO}$ )                          |                    |     | 50   | nA            | $V_{CE} = 10\text{V}$                 |
| Coupled   | Current Transfer Ratio (CTR) (Note 2)<br>SFH600-0, SFH601-1, SFH609-1 | 40                 |     | 80   | %             | $10\text{mA } I_F, 5\text{V } V_{CE}$ |
|           | SFH600-1, SFH601-2, SFH609-2                                          | 63                 |     | 125  | %             | $10\text{mA } I_F, 5\text{V } V_{CE}$ |
|           | SFH600-2, SFH601-3, SFH609-3                                          | 100                |     | 200  | %             | $10\text{mA } I_F, 5\text{V } V_{CE}$ |
|           | SFH600-3, SFH601-4, SFH609-4                                          | 160                |     | 320  | %             | $10\text{mA } I_F, 5\text{V } V_{CE}$ |
|           | SFH600-4, SFH601-5, SFH609-5                                          | 200                |     | 400  | %             | $10\text{mA } I_F, 5\text{V } V_{CE}$ |
|           | SFH600-0, SFH601-1, SFH609-1                                          | 13                 |     |      | %             | $1\text{mA } I_F, 5\text{V } V_{CE}$  |
|           | SFH600-1, SFH601-2, SFH609-2                                          | 22                 |     |      | %             | $1\text{mA } I_F, 5\text{V } V_{CE}$  |
|           | SFH600-2, SFH601-3, SFH609-3                                          | 34                 |     |      | %             | $1\text{mA } I_F, 5\text{V } V_{CE}$  |
|           | SFH600-3, SFH601-4, SFH609-4                                          | 56                 |     |      | %             | $1\text{mA } I_F, 5\text{V } V_{CE}$  |
|           | SFH600-4, SFH601-5, SFH609-5                                          | 68                 |     |      | %             | $1\text{mA } I_F, 5\text{V } V_{CE}$  |
|           | Collector-emitter Saturation Voltage $V_{CE(SAT)}$                    |                    |     | 0.4  | V             | $10\text{mA } I_F, 2.5\text{mA}$      |
|           | Input to Output Isolation Voltage $V_{ISO}$                           | 5300               |     |      | $V_{RMS}$     | See note 1                            |
|           |                                                                       | 7500               |     |      | $V_{PK}$      | See note 1                            |
|           | Input-output Isolation Resistance $R_{ISO}$                           | $5 \times 10^{10}$ |     |      | $\Omega$      | $V_{IO} = 500\text{V}$ (note 1)       |

Note 1 Measured with input leads shorted together and output leads shorted together.

Note 2 Special Selections are available on request. Please consult the factory.

**TYPICAL SWITCHING CHARACTERISTICS**

1. Linear Operation (without saturation) Fig 1.

$I_F = 10\text{mA}$ ,  $V_{CC} = 5\text{V}$ ,  $R_L = 75\Omega$

|                            |     | UNITS         |
|----------------------------|-----|---------------|
| Turn-on Time $t_{on}$      | 3.0 | $\mu\text{s}$ |
| Rise Time $t_r$            | 2.0 | $\mu\text{s}$ |
| Turn-off Time $t_{off}$    | 2.3 | $\mu\text{s}$ |
| Fall Time $t_f$            | 2.0 | $\mu\text{s}$ |
| Cut-off Frequency $F_{CO}$ | 250 | kHz           |

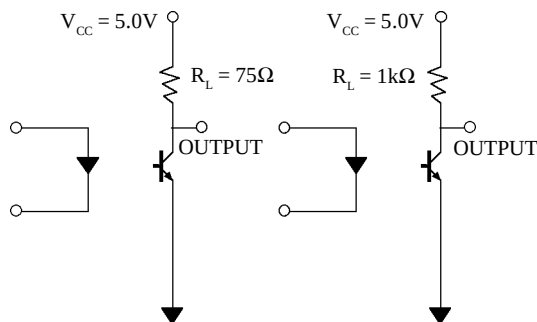


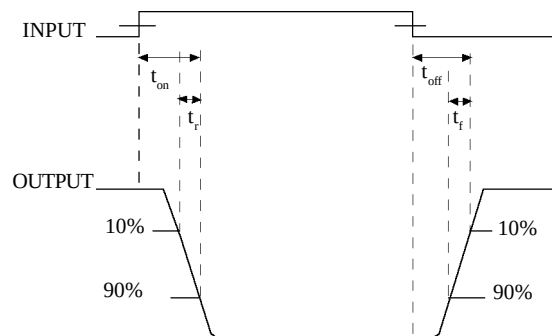
FIG 1

FIG 2

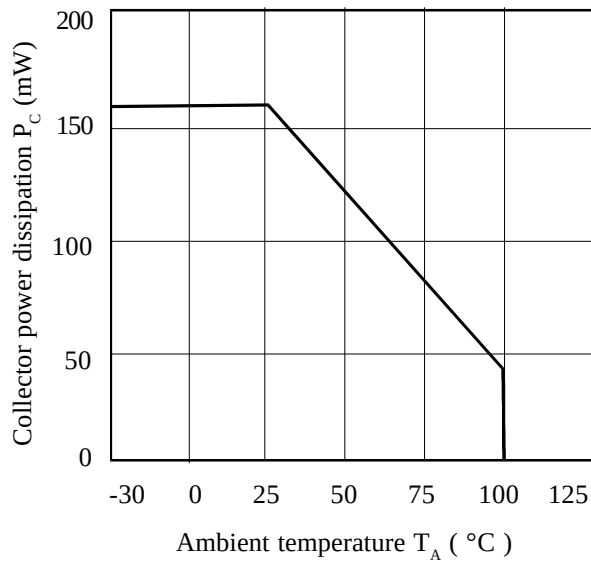
2. Switching Operation (with saturation) Fig 2

$V_{CC} = 5\text{V}$ ,  $R_L = 1\text{k}\Omega$

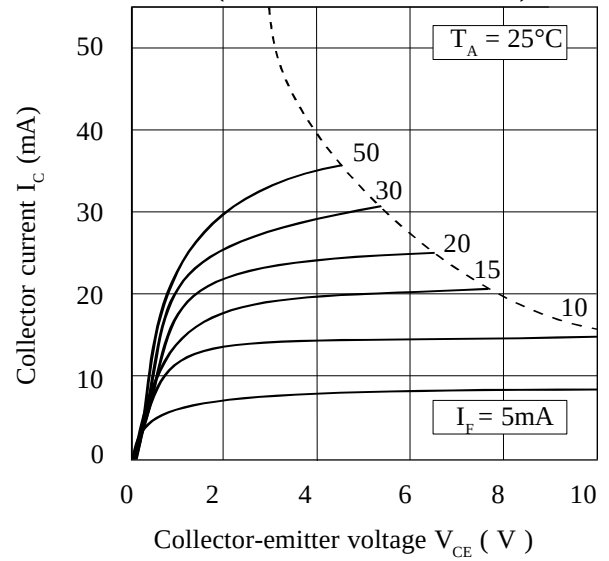
| GROUP                   | 600-0<br>601/9-1<br>( $I_F = 20\text{mA}$ ) | 600-1&2<br>601/9-2&3<br>( $I_F = 10\text{mA}$ ) | 600-3<br>601/9-4&5<br>( $I_F = 5\text{mA}$ ) | UNITS         |
|-------------------------|---------------------------------------------|-------------------------------------------------|----------------------------------------------|---------------|
| Turn-on Time $t_{on}$   | 3.0                                         | 4.2                                             | 6.0                                          | $\mu\text{s}$ |
| Rise Time $t_r$         | 2.0                                         | 3.0                                             | 4.6                                          | $\mu\text{s}$ |
| Turn-off Time $t_{off}$ | 18                                          | 23                                              | 25                                           | $\mu\text{s}$ |
| Fall Time $t_f$         | 11                                          | 14                                              | 15                                           | $\mu\text{s}$ |
| $V_{CESAT}$             | $\leq 0.4$                                  |                                                 |                                              | V             |



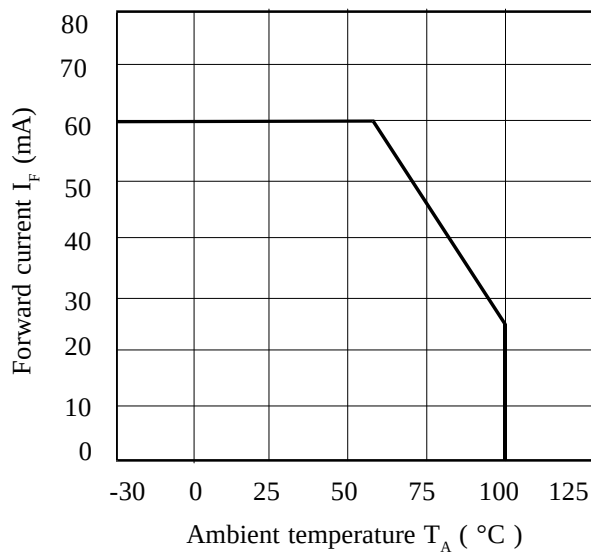
**Collector Power Dissipation vs. Ambient Temperature**



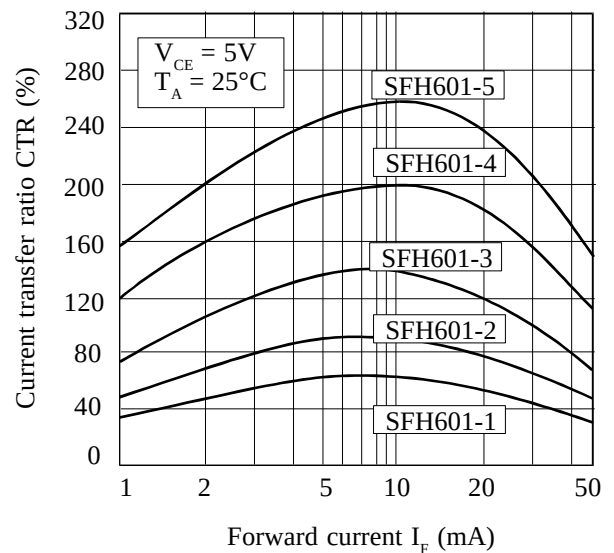
**Collector Current vs. Collector-emitter Voltage (normalised to SFH601-3)**



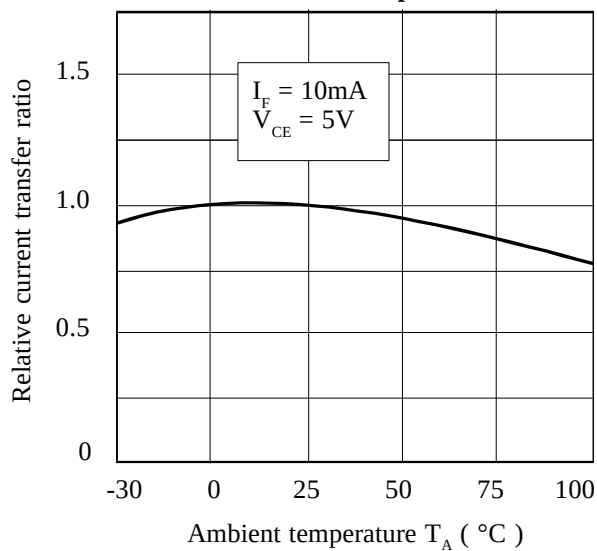
**Forward Current vs. Ambient Temperature**



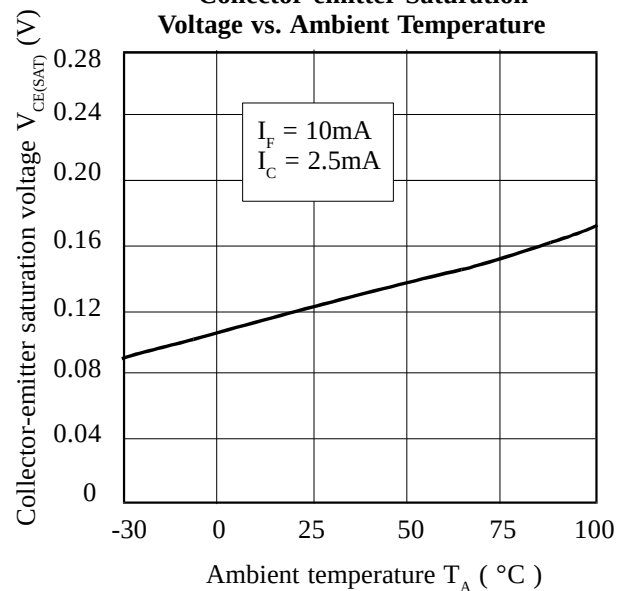
**Current Transfer Ratio vs. Forward Current**



**Relative Current Transfer Ratio vs. Ambient Temperature**



**Collector-emitter Saturation Voltage vs. Ambient Temperature**



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